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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,592	01/21/2004	Ian Humphrey	NGC-162/000388-280	4284

32205 7590 09/11/2007
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EXAMINER	
TURNER, SAMUEL A	

ART UNIT	PAPER NUMBER
2877	

MAIL DATE	DELIVERY MODE
09/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/761,592	HUMPHREY, IAN
	Examiner	Art Unit
	Samuel A. Turner	2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 14, and 15* is/are rejected. .

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2 July 2007 has been entered.

Claim Rejections - 35 USC § 112, first paragraph

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-12, 14, and 15 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitation added to claims 1 and 11, "wherein the closed-loop transfer function has a frequency response of at least 1400 Hz" is new matter. There is no

support in the specification or the appendix for a transfer function frequency response of at least 1400 Hz.

The appendix of the specification defines a closed loop bandwidth for a specific example as 1470.2 Hz on page 20. This does not describe any transfer function frequency response. Applicant points to figures on page 23 of the specification for support for the added limitation. The figures show the transfer function magnitude and phase of the specific example verse frequency. The graphs show the response from 0-200 Hz. This appears to conflict with the "at least 1400 Hz limitation.

Further, the transfer function frequency response is determined by the characteristics of the optical and electrical components. Both claims 1 and 11 base the transfer function on "at least one" characteristic of "one or more" optical components and "one or more" electrical components. There is nothing in the specification that describes a transfer function frequency response based on different combinations of optical and electrical components.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter

pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-12, 14, and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Noureldin et al(IEEE-1999).

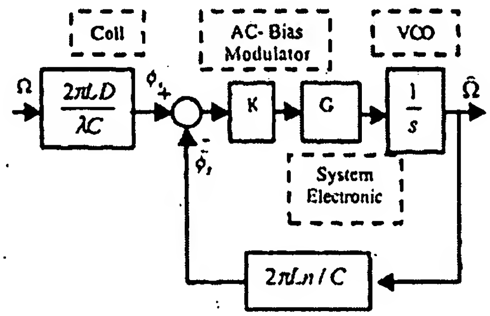

Figure 2. The FOG as a closed loop

With regard to claim 1, Noureldin et al teach a process(**fig. 2**), comprising the step of:

computing, via digital signal processing(**page 633, abstract**), one or more performance parameters of a fiber optic gyroscope(**page 635, section 3**) to determine a relationship between a performance parameter and a physical parameter associated with fiber optic gyroscope components through employment of a closed-loop transfer function(**figure 2, equation 5**) based on at least one characteristic of:

one or more 1-12, 14, and 15 are of the fiber optic gyroscope(**page 633, section 2**); and

one or more electrical components of the fiber optic gyroscope(**page 633, section 2**).

Noureldin et al **fail to teach** wherein the closed-loop transfer function has a frequency response of at least 1400 Hz.

As to claim 2/1, wherein the step of computing, via digital signal processing, the one or more performance parameters of the fiber optic gyroscope to determine a relationship between a performance parameter and a physical parameter associated with fiber optic gyroscope components through employment of the closed-loop transfer function based on the at least one characteristic of the one or more optical components of the fiber optic gyroscope and the one or more electrical components of the fiber optic gyroscope comprises the step of:

computing one or more performance parameters of the fiber optic gyroscope(**page 635, section 3**) through employment of one or more physical parameters of at least one of the one or more optical components and at least one of the one or more electrical components(**page 635, section 2**).

As to claim 3/2, wherein the step of computing the one or more performance parameters of the fiber optic gyroscope through employment of the one or more physical parameters of the at least one of the one or more optical components and the at least one of the one or more electrical components comprises the steps of:

determining one or more relationships between the one or more performance parameters and the one or more physical parameters(**page 635, section 3.1-3.3**); and

employing one or more of the one or more relationships to compute the one or more performance parameters(**figure 3, page 635**).

As to claim 4/3, wherein the step of employing the at least one of the one or more relationships to compute the one or more performance parameters comprises the steps of:

substituting one or more known values of the one or more physical parameters into the one or more relationships(**figure 3, page 635**); and

employing the one or more known values of the one or more physical parameters to compute the one or more performance parameters(**figure 3; page 635, section 3.1-3.3**).

As to claim 5/3, further comprising the step of:

determining one or more desired values of the one or more physical parameters for employment in causation of the one or more performance parameters to equal or approach one or more provided performance parameter values for the fiber optic gyroscope(**figures 3-7; page 635, section 3.1-3.3**).

As to claim 6/5, wherein the step of determining the one or more desired values of the one or more physical parameters for employment in causation of the one or more performance parameters to equal or approach the one or more provided performance parameter values for the fiber optic gyroscope comprises the step of:

employing the one or more desired values of the one or more physical parameters to design the fiber optic gyroscope to equal or approach the one or more provided performance parameter values(**figures 3-7; page 635, section 3.1-3.3**).

As to claim 7/3, wherein the step of employing the at least one of the one or more relationships to compute the one or more performance parameters comprises the step of:

employing the at least one of the one or more relationships and one or more initial values of the one or more physical parameters to compute the one or more performance parameters(**figures 3-7; page 635, section 3.1-3.3**).

As to claim 8/7, wherein the step of employing the one or more of the at least one relationships and the one or more initial values of the one or more physical parameters to compute the one or more performance parameters comprises the steps of:

determining a difference between the one or more performance parameters and one or more provided parameter values for the fiber optic gyroscope(**figures 4-7, page 636**);

iteratively adjusting at least one of the one or more initial values of at least one of the one or more physical parameters through employment of the at least one of the one or more relationships(**figures 4 and 5, page 636**); and

iteratively computing the one or more performance parameters through employment of the at least one relationships and the at least one of the one or more initial values(**figures 4 and 5, page 636**).

As to claim 9/2, wherein the one or more physical parameters comprise one or more of:

an optical power of a light beam in a representation of a first phase modulator(K) in a representation of a feedforward component of the closed-loop transfer function of the fiber optic gyroscope(**fig. 2**);

an operating phase bias applied to one or more counter-propagating light beams in the representation of the first phase modulator in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(K);

a photodetector scale factor in a representation of a photodetector in a representation of a signal digitizer in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(G);

a preamplifier impedance in a representation of a preamplifier in the representation of the signal digitizer in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(G);

a preamplifier gain of the preamplifier in the representation of the signal digitizer in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(G);

a gain in voltage in a representation of a filter after the photodetector and the preamplifier and before an analog-to-digital converter in the representation of the signal digitizer in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(G);

a gain in a representation of the analog-to-digital converter of the representation of the signal digitizer in the representation of the feedforward component of the closed-loop transfer function of the fiber optic gyroscope(G);

a digital truncation gain in a representation of a truncator in a representation of a demodulator in a representation of a feedback component of the fiber optic gyroscope(G);

a transit time for the light beam to propagate through a representation of an optical waveguide in the representation of the feedback component of the closed-loop loop transfer function of the fiber optic gyroscope(**the transit time $\tau = nL/c$ which is contained in $2\pi Ln/c$**); and

a phase modulator scale factor in a representation of a second phase modulator in the representation of the feedback component of the closed-loop transfer function of the fiber optic gyroscope(K).

As to claim 10/1, wherein the closed-loop transfer function comprises:

a summing point(**figure 2**) that receives:

an input based on a rate of rotation of an optical waveguide of a feedback component and a scale factor based on a wavelength of light

propagating through the optical waveguide, an optical path length of the optical waveguide($2\pi LD/\lambda c$), and

a diameter of the optical waveguide(D), as a positive input; and

an input based on a modulated first light beam and a modulated second light beam exiting the optical waveguide of the feedback component as a negative input($2\pi Ln/c$);

wherein the summing point employs the positive input and the negative input to determine a difference between the positive input and the negative input;

a feedforward component that receives the difference between the positive input and the negative input as an input(K);

wherein the feedforward component employs the difference between the positive input and the negative input to provide a signal proportional to a phase difference between the modulated first light beam and the modulated second light beam exiting the optical waveguide of the feedback component as an output(**figure 2, section 2**); and

wherein the feedback component receives the signal proportional to the phase difference between the modulated first light beam and the modulated second light beam exiting the optical waveguide of the feedback component as an input(**figure 2, section 2**); and

wherein the feedback component employs the signal proportional to the phase difference between the modulated first light beam and the modulated second

light beam exiting the optical waveguide of the feedback component to produce a feedback signal(**figure 2, section 2**); and

wherein the feedback component employs the feedback signal to produce the modulate first light beam and the modulated second light beam exiting the optical waveguide of the feedback component(**figure 2, section 2**).

With regard to claim 11, Noureldin et al teach an article, comprising:

one or more storage media readable by a processor(**computer simulation; page 633, abstract**);

means in the one or more storage media for computing, via digital signal processing, one or more performance parameters of a fiber optic gyroscope(**figure 2**) to determine a relationship between a performance parameter and a physical parameter associated with fiber optic gyroscope components through employment of a closed-loop transfer function based at least one characteristic of:

one or more optical components of the fiber optic gyroscope(**figure 2, section 2**); and

one or more electrical components of the fiber optic gyroscope(**figure 2, section 2**).

Noureldin et al **fail to teach** wherein the closed-loop transfer function has a frequency response of at least 1400 Hz.

As to claim 12/11, wherein the means in the one or more storage media for computing, via digital signal processing, the one or more performance parameters of

the fiber optic gyroscope to determine a relationship between a performance parameter and a physical parameter associated with fiber optic gyroscope components through employment of the closed-loop transfer function based on the at least one characteristic of the one or more optical components of the fiber optic gyroscope and the one or more electrical components of the fiber optic gyroscope comprises:

means in the one or more storage media for determining one or more relationships(**figure 3, page 635**) between one or more physical parameters and one or more performance parameters of:

at least one of the one or more optical components(**figure 2, section 2**); and

at least one of the one or more electrical components(**figure 2, section 2**); and

means in the one or more storage media for employing at least one of the one or more relationships to determine the one or more performance parameters(**figure 2, section 3**).

As to claim 14/12, wherein the one or more performance parameters comprise one or more of a bandwidth of the fiber optic gyroscope, a coefficient of random walk of the fiber optic gyroscope, an operating frequency of the fiber optic gyroscope, and a power spectral density of noise of the fiber optic gyroscope(**figures 3-7; page 635, section 3.1-3.3**).

As to claim 15/14, wherein the coefficient of random walk of the fiber optic gyroscope is computed as a function of optical power noise, shot noise, analog-to-digital converter quantization noise, preamplifier thermal noise, preamplifier current noise, preamplifier voltage noise, phase modulation, and gain(page 635, section 3.2).

CLAIMS 1 and 11:

With regard to claims 1 and 11, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Noureldin et al to provide a frequency response of at least 1400Hz. This would have been based on the specific optical and electrical component values simulated.

The motivation for this modification is found in Noureldin et al which teaches that the gain of the electronic components and length of the fiber coil are related to rise time. Claims 2-10, 12, 14, and 15 are dependent from either claim 1 or 11 and therefor are also included in the rejection.

Response to Arguments

Applicant's arguments filed 2 July 2007 have been fully considered but they are not persuasive.

Applicant refers to 50 second rise time as a "time constant". In Noureldin et al there is no mention of a 50 second time constant. Instead Noureldin et al teaches that the rise time is based of the optical and electrical component values modeled. Applicant has failed to show that the closed loop transfer function of Noureldin et al

would not have a transfer function frequency response of at least 1400 Hz if the desired components are used to obtain such a response. This would have been adjusting the optical and electrical components to obtain a desidered value. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
Primary Examiner
Art Unit 2877